Remarks

Claims 1, 2 and 4-7 are under consideration in this case. A "clean" set of amended claims is provided above. Amendments made to the claims are indicated in the section entitled "Version Showing Changes Made", which follows these remarks.

Claim 1 has been amended for clarity. Applicants submit that this amendment raises no new issues, since it is clear that the Examiner has been considering the claims as encompassing the invention as now worded.

Rejection under 35 U.S.C. § 101

Claims 1, 2 and 4-7 are rejected under 35 U.S.C. § 101 for lacking utility "because the claimed invention is not supported by either a specific and/or substantial asserted utility or a well established utility." Applicants respectfully traverse.

Applicants first direct the Examiner's attention to the recently published Guidelines for Examination of Applications for Compliance With the Utility Requirement (1242 OG 167, Jan. 30, 2001). Relevant excerpts are reproduced here to support Applicants' position that the claimed invention has "utility" in compliance with 35 U.S.C. § 101 and the Office Action does not provide a *prima facie* showing of lack of utility. For example, in B1:

> (c) If at any time during the examination, it becomes readily apparent that the claimed invention has a well-established utility, do not impose a rejection based on lack of utility. An invention has a well-established utility (1) if a person of ordinary skill in the art would immediately appreciate why the invention is useful based on the characteristics of the invention (e.g., properties or applications of a product or process), and (2) the utility is specific, substantial and credible.

Furthermore, in B2:

> (a) If the applicant has asserted that the claimed invention is useful for any particular practical purpose (i.e., it has a "specific and substantial

utility") and the assertion would be considered credible to a person of ordinary skill in the art, do not impose a rejection based on lack of utility.

(1) A claimed invention must have a specific and substantial utility. This requirement excludes "throw-away," "insubstantial" or "nonspecific" utilities, such as the use of a complex invention as landfill . . . .

And in B3:

Any rejection based on lack of utility should include a detailed explanation why the claimed invention has no specific and substantial utility. Whenever possible, the examiner should provide documentary evidence regardless of publication date . . . to support the factual basis for the *prima facie* showing of no specific and substantial credible utility. If documentary evidence is not available, the examiner should specifically explain the scientific basis for his or her factual conclusions.

(a) Where the asserted utility is (allegedly) not specific or substantial, a *prima facie* showing must contain the following elements:

(1) An explanation that clearly sets forth the reasoning used in concluding that the asserted utility for the claimed invention is not both specific and substantial nor well-established;

(2) Support for factual findings relied upon in reaching this conclusion; and

(3) An evaluation of relevant evidence of record, including utilities taught in the closest prior art.

Finally, in B4:

A rejection based on lack of utility should not be maintained if an asserted utility for the claimed invention would be considered specific, substantial and credible by a person of ordinary skill in the art in view of all evidence of record. Office personnel are reminded that they must treat as true a statement of fact made by an applicant in relation to an asserted

utility . . . .

It appears from the rejection found in Paper No. 26 (Office Action mailed 5/3/00) that the factual basis for this rejection is "no known biological activity is known or described in the specification that is associated with even the preferred nucleic acid embodiment depicted as SEQ ID NO:1" (page 3, first paragraph). Applicants submit that a biological activity of the subject protein, DRG11, is provided in the specification. And, even if it were not, this would not render the asserted utility non-specific or insubstantial in light of the disclosure.

Regarding the biological activity of DRG11, the skilled artisan will immediately recognize that this protein is a transcription factor. Although the sequence is novel, it is described as a homeodomain protein (*see, e.g.*, Title) in the PHD family (*see, e.g.* page 29, lines 12-13). Homeodomain proteins are well known in the art as transcriptional regulators. The biological activity of DRG11 is supported not only by its distinctive homeodomain sequence and sequence homology with other transcription factors, but also by its localization to the nucleus, as shown with antibody staining (*see, e.g.*, page 32, lines 26-27). The skilled artisan would not question the assertion that DRG11 is a transcription factor, but rather, would come to the same conclusion on their own.

Regardless of the known biological activity of DRG11, the stated utility of providing a means of identifying and isolating peripheral sensory neurons (page 20, lines 5-7) is not only a specific and substantial utility, it is a well-established utility. The DRG11 protein is shown in the present disclosure to be a tool that may be used as described. Evidence of a desirable and established utility is apparent when those of skill in the art have been shown to seek such a tool. Evidence of this is provided in the background of the specification, wherein several references are cited as describing similar tools in different neuronal systems (page 1, lines 8-16), and efforts to find such a tool for use in the peripheral sensory system have been unsatisfactory (page 2, lines 9-15). The skilled artisan in the filed would immediately recognize the utility of the present invention.

The present Office Action has not suggested that the asserted utility is not credible, but only that it is not specific and substantial. However, the Office Action cites no documentary evidence to support this conclusion. The determination of no specific utility is supported in Paper No. 26 by the argument that " . . . many genes are expressed in a particular cell type; thereby not being "specific", by definition, because such "markers" apply to a *general* class of compound." (Page 3, first full paragraph; emphasis in original). However, as Applicants has pointed out above, DRG11 may be used to identify sensory neurons to the exclusion of other cell types, such a marker having been sought in the field but not found (*see*, page 2, lines 9-15 of the specification). Furthermore, the courts have found that utility does not require that an invention be the exclusive means of performing the useful function. "An invention need not be the best or the only way to accomplish a certain result, and it need only be useful to some extent and in certain applications . . . ." (Carl Zeiss Stiftung v. Renishaw plc, 20 USPQ2d 1094, 1100 (Fed. Cir. 1991). The present invention is specific in its identification of peripheral sensory neurons, regardless of other markers that might be similarly useful. Furthermore, the Examiner has asserted that other genes may be expressed in a particular cell type, but the utility lies in the expression in this specific cell type to the exclusion of other cell types. Despite the Examiners comments that many other genes are expressed in a given cell type, none have been identified that have the characteristic specificity of DRG11.

Applicants have pointed out that isolation of sensory neurons is desirable for the investigation of neurodegenerative disease or neural injury in these cells. The present Office Action states that "because further research is required for investigation of neurodegenerative disease or neural injury, by definition, no substantial utility can exist, by definition." (Page 3, first full paragraph; internal quotes omitted). The utility of the present invention may be likened to a method or substance useful for extracting protein from a cell lysate. By the Office Action argument, this method or substance would have no substantial utility, because it would take further work to isolate a specific desired protein related to a specific disease. Similarly, a system for isolating nucleic acids, such as a biochip, would not have utility by the argument in the Office Action, because it

would require further investigation to determine a utility for these nucleic acids.

Applicants submit that the ability to provide pools of isolated peripheral sensory neurons is a utility unto itself, as would be immediately recognized by the skilled artisan. The invention provides an improved means of studying diseases that are specific to or usually affect peripheral neurons, such as infection by herpes simplex virus, herpes zoster virus and vericella-zoster virus, diabetic neuropathy and other neuropathies resulting from genetic disorders (e.g., hereditary sensory neuropathy type I) and autoimmune and demyelinating diseases (e.g., multiple sclerosis) and inflammatory disease (e.g., arthritis). These peripheral neuron isolates would also be useful for studying neuronal injury, neurotrophic factors (e.g., nerve growth factor) and neurotransmitters.

For the reasons discussed above, the invention of Claims 1, 2, and 4-7 does have the requisite utility to satisfy the requirements of 35 U.S.C. § 101. Therefore, Applicants respectfully request that this rejection be withdrawn.

Rejections under 35 U.S.C. § 112

Claims 1, 2 and 4-7 are rejected under 35 U.S.C. § 112, first paragraph as not teaching how to make and use the invention due to lack of utility under 35 U.S.C. §101. As discussed above, the cited claims do satisfy the utility requirements. Therefore, Applicants respectfully request that this rejection be withdrawn

Claims 1, 2 and 4-7 are rejected under 35 U.S.C. § 112, as not being supported by a sufficient written description. Applicants respectfully traverse.

In considering whether the written description requirement is satisfied for a claim, "the fundamental factual inquiry is whether a claim defines an invention that is clearly conveyed to those of skill in the art at the time the application was filed." (MPEP § 2163.02). The specification must convey to the skilled artisan that the inventors were in possession of what is claimed. This, of course, takes into consideration what is generally known in the art at the time of filing. This also cannot be construed to require that the inventors literally had every embodiment of the invention in their physical possession, but

that they had a clear idea of what the invention encompassed and conveyed that to the skilled artisan.

Literal support for the claim language is found in the specification at page 7, lines 22-24. As the specification goes on to explain, high stringency hybridization conditions are well known in the art. The skilled artisan could easily visualize cDNA or recombinant nucleic acid sequences that would (or would not) hybridize under high stringency conditions with a nucleic acid having the specified sequence. Furthermore, routine experimentation would reveal any questionable sequences, which would be relatively few in number. Given the general knowledge in the field regarding hybridization and the ease with which such a determination could be made by the skilled artisan, Applicants submit that they were in possession of the claimed invention at the time the present application was filed.

Applicants also do not understand the Examiner's concern with 5′ and 3′ sequences of hybridizing nucleic acids. Applicants assume that this concern must be related only to the "recombinant nucleic acid" component of the claim, since the "cDNA" language was suggested by the Examiner to avoid this rejection. The nucleic acid sequence encoding a DRG11 protein is disclosed. The claimed cDNA and recombinant nucleic acid must hybridize under high stringency conditions with a complement of this sequence. Sequences 5′ and 3′ to this are not relevant, because they do not contribute to this hybridization. Furthermore, extensive instruction is provided in the specification regarding manipulation of recombinant nucleic acid (*see* page 10, line 11 to page 16, line 5). The skilled artisan is readily capable of manipulation of 5′ and/or 3′ sequences of a recombinant nucleic acid. What is 5′ or 3′ to the identified sequence is not relevant to the present invention, because it may be altered as desired by the skilled artisan, using general knowledge in the art. One should not be able to avoid a claim simply by adding nucleic acid to the 5′ and/or 3′ ends of an otherwise infringing nucleic acid. Applicants have identified and characterized a novel and useful nucleic acid sequence and should be able to claim a nucleic acid comprising the same.

For the reasons discussed above, Claims 1, 2 and 4-7 satisfy the written

description requirements of 35 U.S.C. § 112, first paragraph. Therefore, Applicants respectfully request that this rejection be withdrawn.

In light of the above remarks, Applicants submit that the present application is in condition for allowance and respectfully request early notification of such.

Respectfully submitted,

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SF-1053091v1

VERSION SHOWING CHANGES MADE

1. (Thrice Amended) An isolated cDNA or recombinant nucleic acid comprising a nucleic acid encoding a DRG11 protein, wherein said [cDNA or recombinant] nucleic acid encoding a DRG11 protein hybridizes under high stringency conditions to a complement of a nucleic acid molecule having a sequence as set forth in SEQ ID NO:1, and wherein said DRG11 protein is characterized by its natural expression in sensory neurons and dorsal horn neurons of the spinal cord and wherein its natural expression is absent in non-neuronal cells, sympathetic neurons and ventricular neurons of the spinal cord.

2. (Twice Amended) An isolated nucleic acid according to claim 1 encoding the amino acid sequence depicted in Figure 3 (SEQ ID NO:2).

4. (Twice Amended) An isolated nucleic acid according to claim 1 comprising the nucleic acid depicted in Figure 2 (SEQ ID NO:1).

5. (Amended) An isolated nucleic acid according to claim 1 operably linked to an expression vector comprising transcriptional and translational regulatory DNA.

6. A host cell transformed with an expression vector according to claim 5.

7. (Amended) A method of producing a DRG11 protein comprising:

a) culturing a host cell transformed with an expression vector comprising a nucleic acid according to claim 1; and

b) expressing said nucleic acid to produce a DRG11 protein.